Rec. zool. Surv. India: Vol. 121(1)/31–37, 2021
DOI: 10.26515/rzsi/v121/i1/2021/152386

ISSN (Online) : 2581-8686
ISSN (Print) : 0375-1511

First record of *Sphaerotheca magadha* Prasad *et al*., 2019 (Amphibia: Anura: Dicroglossidae) From West Bengal, India

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Abstract

The Magadha Burrowing frog (*Sphaerotheca magadha*) described in 2019 from Jharkhand is being reported for the first time from West Bengal State with the collection of three specimens from Paschim Bardhaman district. The specimens were photographed in the field, preserved and then deposited in Zoological Survey of India, Kolkata where morphological and morphometric studies were carried out for proper species identification. This is the first record of the species from any other State of India outside its type locality.

Keywords: Jharkhand, Magadha Burrowing Frog, Paschim Bardhaman District

Introduction

India is home to 447 species of amphibians of which 406 species are Anurans (Dinesh *et al.*, 2020). The genus *Sphaerotheca* Günther, 1859 is represented by 10 species of which 6 species are reported from India (Dinesh *et al*., 2019) including the recently described *Sphaerotheca magadha* Prasad *et al*., 2019. Only one species of this genus, *Sphaerotheca breviceps* (Schneider, 1799) is known from West Bengal (Deuti, 1995; Pratihar & Deuti, 2011).

Sphaerotheca magadha is a small sized frog quite recently described from Jharkhand, India (Prasad *et al*., 2019) and has been reported only from its type locality. Though a number of surveys were undertaken in various parts of West Bengal this species was not observed earlier, which may be due to the fact that all the studies from the State were done before 2019 and the researchers might have overlooked this species or may have confused it with the known *S. breviceps* reported earlier from this locality. Some of these works from northern West Bengal did not mention the presence of any *Sphaerotheca* species in their reports (Pramanik *et al*., 2010; De, 2016; Deuti *et al*., 2017). However, there are reports of *S. breviceps* from the southern part of the State in a few studies (Sarkar 1984; Deuti, 1995; Pratihar & Deuti, 2011), but there is no mention of any other *Sphaerotheca* in those literatures. Various studies have also been done on the amphibians of Paschim Bardhaman district (Pal *et al*., 2012; Dutta & Mukhopadhyay, 2013; Chatterjee & Mondal, 2016) but there is no mention of any *Sphaerotheca* sp. from the district.

Therefore, this is the first report of this species from the State of West Bengal with collection of three specimens and photographic evidences.

Material and Methods

Surveys were carried out in the Durgapur and Asansol areas of Paschim Bardhaman district, West Bengal from June 2017 to September 2019 to figure out the amphibian diversity of the region. The burrowing frog was identified following the original description (Prasad *et al*., 2019). Three specimens collected on 25th July, 2019 from temporary water pools and agricultural fields were brought to the laboratory for confirmation. These specimens were fixed in 4% formaldehyde solution and then preserved in 70% ethanol and registered at Zoological Survey of India, Kolkata under the accession numbers ZSI A14500-A14502. 27 morphological characters of the specimens were measured using Mitutoyo™ digital calipers (to the nearest 0.1 mm). A map was prepared using ArcGIS software version 10.2.2 (Figure 1). Photographs were taken using Nikon Coolpix B700 camera.

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Article Received on: 11.05.2020 Accepted on: 19.11.2020

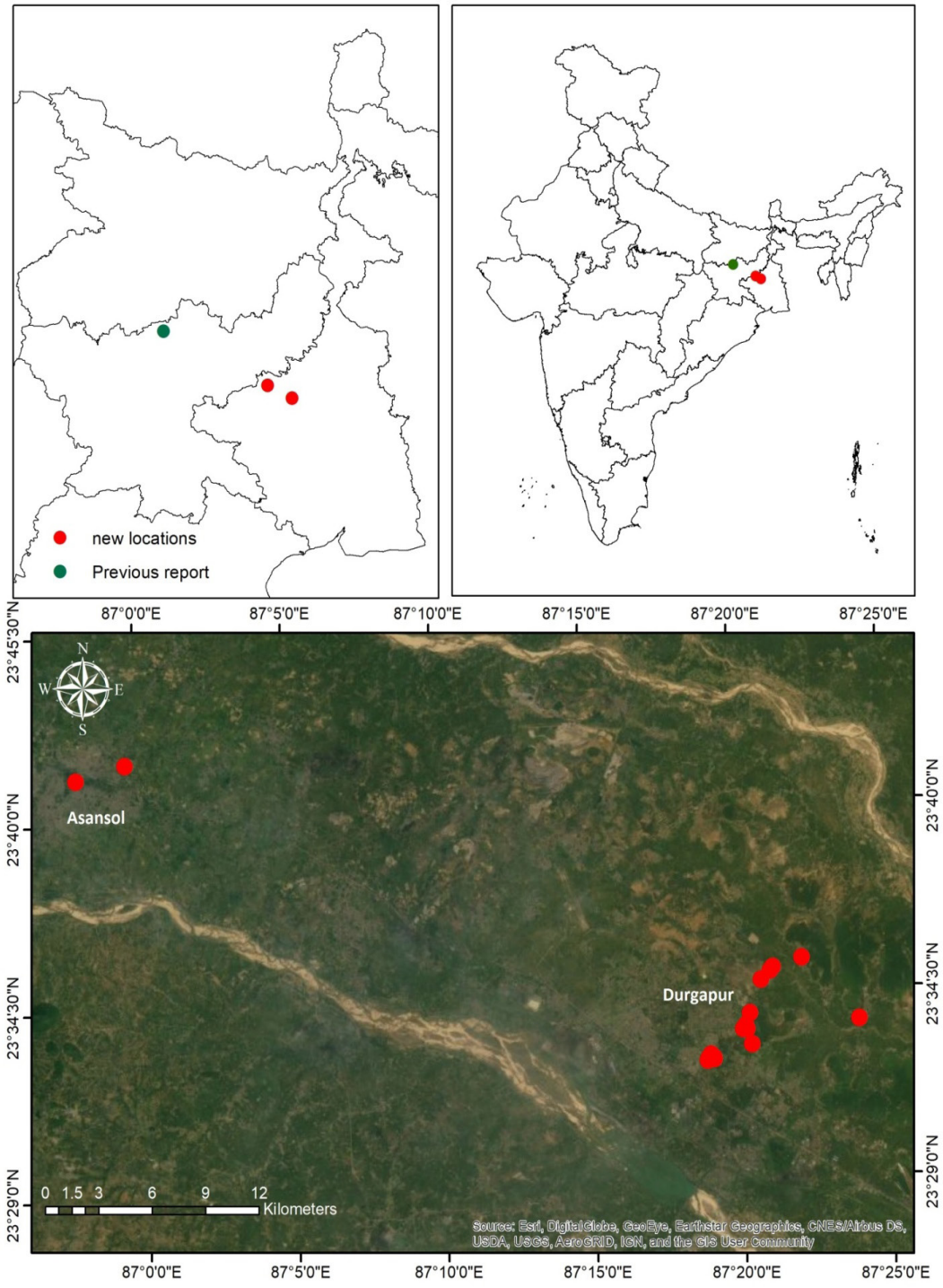

Figure 1. Distribution map of *Sphaerotheca magadha* Prasad *et al.*, 2019.

Materials examined: ZSI A 14500, 1 ex, Heemsheela Grassland, Durgapur, Paschim Bardhaman, West Bengal (23.54161° N, 87.31515° E), 25.vii.2019; ZSI A 14501, 1 ex, Heemsheela Grassland, Durgapur, Paschim Bardhaman, West Bengal (23.54161° N, 87.31515° E), 25.vii.2019; ZSI A 14502, 1 ex, Pardaha Agricultural area, Durgapur, Paschim Bardhaman, West Bengal (23.55908° N, 87.33821° E), 25.vii.2019.

Results and Discussion

Identification of the Species

The species can easily be differentiated from other congeneric species by its medium size (SVL 31-33 mm), squat and stumpy body, wider head width as compared to head length, rounded snout, angled canthus rostralis, first finger longer than second but sub-equal to third, shorter hind limbs which do not touch when folded at right angles to the body, tibio-tarsal articulation reaching to the front of shoulders, moderate webbing on feet, distinct shovel-shaped inner metatarsal tubercle and a prominent tarsal tubercle.

The description and measurements of the collected specimens (Table 1) are given below.

Head: Head is wider (HW = 12.98 mm) than long (HL = 10.57 mm); Snout rounded (SL = 6.40 mm), canthus rostralis angled, nostril nearer to the tip of the snout (SN = 3.00 mm) than to the eye (NE = 3.72 mm); Inter-orbital space between the back of the eyes (IBE = 9.28 mm) is 1.4 times more than the inter-orbital distance between the front of the eyes (IFE = 6.79 mm) and is larger than inter-narial space (IN = 3.07 mm); tympanum distinct and present below the supratympanic fold (TD = 2.68 mm) and nearer to the eye (ET = 1.89 mm).

Forelimbs: Forelimbs short and robust; fingers short, first finger (FL1 = 4.10 mm) longer than the second (FL2 = 3.23 mm) and sub equal to the third (FL3 = 4.08 mm), relative arrangement of the fingers I = III >II > IV; tips rounded and blunt without any discs or dilations; webbing absent between the fingers; subarticular tubercles prominent and rounded.

Hindlimbs: Legs short, do not touch when folded at right angles, tibio tarsal articulation reaching upto the shoulders; relative arrangement of toes I<II<V≤III<IV, webbing moderate in the toes, inner meta tarsal tubercle well developed, prominent and shovel shaped (IMT = 2.12); tarsal tubercle prominent.

Colour: In preservative, the dorsum is washed stone black in colour with dotted glandular folds in the form of blotches, ventrum smooth and whitish, vocal sacs blackish in colour. In life, the dorsum is light greenish brown to greyish brown in colour and ventrum whitish in colour, hind legs and forearms barred.

Vocal Sacs: Two external vocal sacs are present in the males which are black in colour.

On 17th August 2018, the authors first encountered a single individual of this species from a grassland area of Durgapur (23.54366°N, 87.31737°E). Later on 25th July 2019, some individuals were observed at Heemsheela grassland area (23.54161°N, 87.31515°E) and Pardaha agricultural area (23.55908°N, 87.33821°E) of Durgapur of which 3 individuals were collected for proper identification and morphological studies. The calling males were found in temporary water pools and agricultural fields. Further observations of individuals of this species were recorded from various parts of the district like Malandighi (23.56136°N, 87.40213°E), Bijra (23.58468°N, 87.35219°E), Andal (23.5795°N, 87.22824°E) and Asansol (23.67394°N, 86.95239°E) areas. Judging from the number of calling individuals, the species appears to be locally abundant in Paschim Bardhaman district. The suitable habitat was found to be agricultural fields and temporary water pools.

This report forms the first record of this species from the State of West Bengal. The present report of *S. magadha* from West Bengal based on collected specimens and photographic evidences extends its range by at least 210 km eastward (Paschim Bardhaman district, West Bengal) from its type locality in Nawadih village, Koderma, Jharkhand.

With the backdrop of this report of *S. magadha* from Paschim Bardhaman district of West Bengal, the reports of *S. breviceps* from different areas of West Bengal (Sarkar 1984; Sarkar et al, 1992; Deuti, 1995; Pratihar & Deuti, 2011) which is aerially more than 1800 km away from the type locality of *S. breviceps*, may include *S. magadha* or may represent some other species too. More detailed studies including proper morphological and molecular studies of the specimens throughout the State are needed.

Table 1. Morphometric measurements of collected specimens of *Sphaerotheca magadha*

Measurements in mm	ZSI A 14500	ZSI A 14501	ZSI A 14502	Mean± SD	Prasad et al. 2019
Sex of the Individual	Male	Male	Male		Mean±SD (Male)
Snout-Vent Length (SVL)	32.78	31.21	31.42	31.80±0.49	31.1±1.9
Head Length (HL)	10.02	11.27	10.42	10.57±0.37	9.2±0.6
Head Width (HW)	12.80	13.75	12.40	12.98±0.40	11.7±1.4
Snout Length (SL)	6.18	6.58	6.44	6.40±0.12	4.5±0.5
Eye-Nostril Distance (NE)	3.90	3.27	3.98	3.72±0.22	2.1±0.6
Nostril-Snout tip Distance (NS)	2.72	3.42	2.86	3.00±0.21	-
Eye Diameter (ED)	3.48	4.14	4.54	4.05±0.31	-
Tympanum Diameter (TD)	2.56	2.96	2.53	2.68±0.14	1.3±0.3
Eye-Tympanum Distance (ET)	1.90	1.96	1.82	1.89±0.04	-
Inter narial Distance (IN)	2.88	3.38	2.95	3.07±0.15	3.0±0.6
Inter orbital Distance at front of eyes (IFE)	6.53	6.80	7.05	6.79±0.15	5.2±0.8
Inter orbital Distance at back of eyes (IBE)	8.89	10.12	8.82	9.28±0.42	9.6±0.6
Brachium Length (HuL)	8.10	7.34	7.70	7.71±0.22	-
Antebrachium Length (FaL)	7.47	7.21	7.20	7.29±0.09	-
First Finger Length (FL 1)	3.90	4.33	4.08	4.10±0.12	4.0±1.0
Second Finger Length (FL 2)	3.05	3.32	3.31	3.23±0.09	2.9±0.8
Third Finger Length (FL3)	4.25	4.07	3.92	4.08±0.10	4.3±0.8
Fourth Finger Length (FL 4)	2.10	3.14	2.21	2.48±0.33	-
Axilla-Groin Distance (AGL)	8.83	10.06	10.39	9.76±0.47	12.9±0.4
Thigh Length (FL)	8.54	9.90	8.73	9.06±0.43	-
Shank Length (ShL)	13.33	12.73	13.65	13.24±0.27	13.0±1.6
First toe Length (T1)	2.05	2.04	2.02	2.04±0.01	-
Second toe Length (T2)	5.32	4.53	4.84	4.90±0.23	-
Third toe Length (T3)	7.28	6.28	7.14	6.90±0.31	-
Fourth toe Length (T4)	12.20	12.71	11.26	12.06±0.42	-
Fifth toe Length (T5)	6.48	6.61	6.24	6.44±0.11	-
Inner Metatarsal Tubercle (IMT)	2.13	2.04	2.18	2.12±0.04	3.0±0.2

Size: Medium sized frog (Mean SVL = 31.80 mm, range 31.42-32.78 mm) with robust and stumpy toad like body appearance.

Figure 2. **(A)** Specimen of *Sphaerotheca magadha* in life collected from Durgapur, Paschim Bardhaman; **(B)** Male showing the two external vocal sacs; **(C)** Ventral view of the specimen (ZSI A14500) collected from Durgapur; **(D)** Ventral view of the foot with the arrow showing the inner metatarsal tubercle; **(E)** Ventral view of the hand.

Figure 3. Typical habitat of *Sphaerotheca magadha* from Durgapur, Paschim Bardhaman district, West Bengal.

Acknowledgements

The first author gratefully acknowledge Dr. Utpal Singha Roy (Assistant Professor, Department of Zoology, P. R. Thakur Government College), Dr. Tapajit Bhattacharya (Assistant Professor, PG Department of Conservation Biology, Durgapur Government College) and Mr. Saurav Kumar Dey for their immense help during the field studies. The second author thanks Dr. Kailash Chandra, Director, Zoological Survey of India for providing necessary laboratory facilities.

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